# Dell Storage MD1400 Enclosures Hardware Owner's Manual

# Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

**CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.**

**WARNING: A WARNING indicates a potential for property damage, personal injury, or death.**

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# About your enclosure

## Front-panel features and indicators

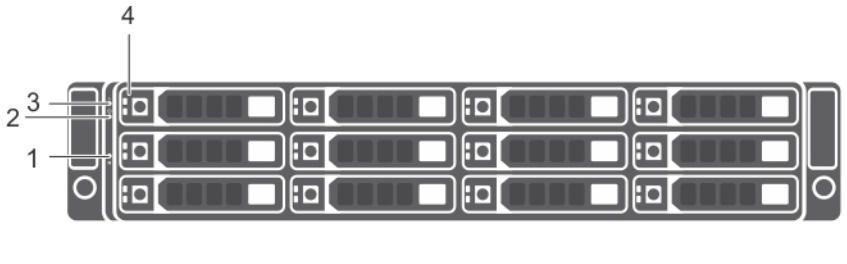


**Figure 1. Front-panel features and indicators**

| Item | Indicator, Button, or Connector | Icon | Description |
|---|---|---|---|
| 1 | System identification button | | The system identification button on the front control panel can be used to locate a particular enclosure within a rack. When the button is pressed, the system status indicators on the control panel and the EMM blink blue until the button is pressed again. |
| 2 | Power LED | | The power LED lights when at least one power supply unit is supplying power to the enclosure. |
| 3 | Enclosure status LED | | The enclosure status LED glows when the enclosure power is on.<br><br>Glows solid blue during normal operation.<br><br>Blinks blue when a host server is identifying the enclosure or when the system identification button is pressed.<br><br>Blinks amber or remains solid amber for a few seconds and then turns off when the EMMs are starting or resetting.<br><br>Blinks amber for an extended time when the enclosure is in a warning state.<br><br>Remains solid amber when the enclosure is in the fault state. |
| 4 | Hard disk drives | | Up to 12 3.5-inch SAS hot-swappable hard disk drives. |

# Front-bezel features and indicators

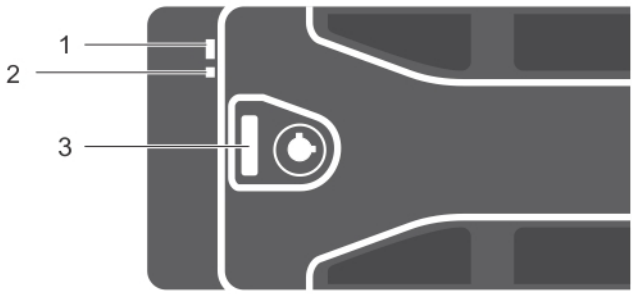


**Figure 2. Front-bezel features and indicators**

| Item | Indicator, Button, or Connector | Icon | Description |
|---|---|---|---|
| 1 | Enclosure status LED | | The enclosure status LED lights when the enclosure power is on.<br><br>Lights solid blue during normal operation.<br><br>Blinks blue when a host server is identifying the enclosure or when the system identification button is pressed.<br><br>Blinks amber or remains solid amber for a few seconds and then turns off when the EMMs are booting or resetting.<br><br>Blinks amber for an extended time when the enclosure is in a warning state.<br><br>Remains solid amber when the enclosure is in the fault state. |
| 2 | Power LED | | The power LED lights when at least one power supply unit (PSU) is supplying power to the enclosure. |
| 3 | Latch | | The latch is used to remove the bezel from the enclosure. |

# Hard disk drive indicator patterns

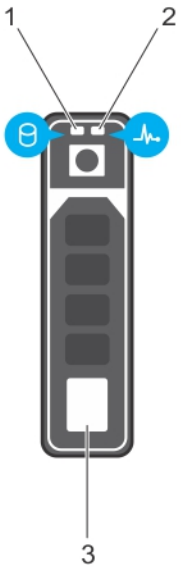


**Figure 3. Hard disk drive indicators**

1. hard disk drive activity indicator (green)
2. hard disk drive status indicator (green and amber)
3. hard disk drive

| Hard disk drive- status indicator pattern (RAID Only) | Condition |
|---|---|
| Blinks green two times per second | Identify hard disk drive or preparing for removal |
| Off | Hard disk drive ready for insertion or removal<br><br>**NOTE:** The hard disk drive status indicator remains off until all hard disk drives are initialized after system power is turned on. Hard disk drives are not ready for insertion or removal during this time. The Dell PowerEdge RAID controller PERC H830 and 12Gb SAS HBA may take up to a minute to discover and initialize all the hard disk drives. |
| Blinks green, amber, and off | Hard disk drive predicted failure |
| Blinks amber four times per second | Hard disk drive failed |
| Blinks green slowly | Hard disk drive rebuilding |
| Steady green | Hard disk drive online |

| Hard disk drive- status indicator pattern (RAID Only) | Condition |
|---|---|
| Blinks green for three seconds, amber for three seconds, and turns off in six seconds. | Rebuild aborted |

# Back-panel features and indicators

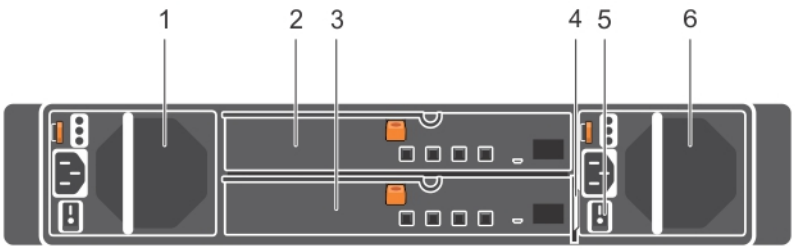


**Figure 4. Back-panel features and indicators**

| Item | Indicator, Button, or Connector | Description |
|---|---|---|
| 1 | Power supply unit or cooling fan module (PS1) | 600 W power supply.<br>For more information, see Power indicator codes. |
| 2 | Primary enclosure management module (EMM 0) | The EMM provides:<br>• a data path between the enclosure and the host server. |
| 3 | Secondary EMM (EMM 1) | • enclosure management functions for your enclosure. |
| 4 | Information tag | A slide-out label panel, which allows you to record Service Tag. |
| 5 | Power switches (2) | The power switch controls the power supply output to the enclosure. |
| 6 | Power supply unit or cooling fan module (PS 2) | 600 W power supply.<br>For more information, see Power indicator codes. |

# Enclosure Management Module

Each EMM provides the following data path and enclosure management functions for your enclosure:

- Monitoring and controlling enclosure environment elements such as temperature, fan, power supply units, and enclosure LEDs.
- Controlling access to hard disk drives.
- Communicating enclosure attributes and states to the host server.

**NOTE:** At least one EMM must be installed in the enclosure. If only one EMM is installed in the enclosure, it must be installed in the primary EMM bay and a blank must be installed in the secondary EMM bay. See Installing an EMM blank .

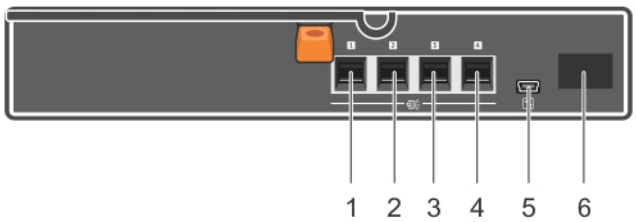


**Figure 5. Enclosure Management Module**

| Item | Indicator, Button, or Connector | Icon | Description |
|---|---|---|---|
| 1,2,3,4 | SAS port (Input or Output) | | Provides SAS connections for cabling the host or an upchain expansion enclosure and to the next down chain expansion enclosure in a daisy chain.(Single Port, Redundant, and Multi-chain Configuration) |
| 5 | USB Mini-B (serial debug port) | | For engineering use only. |
| 6 | 7-Segment Display | | Display the enclosure location in SAS Chain. |

## Enclosure failover when two EMMs are installed

If two EMMs are installed, a certain degree of failover is offered. Control and monitoring of the enclosure elements can be transferred from one EMM to another in the event of an EMM failure. A failover occurs whenever network communication is ended between an EMM and its peer.

In the event of a peer EMM failure, the surviving EMM activates the amber status LED of the failed EMM. The surviving EMM then takes over the responsibility of enclosure management, which includes monitoring and control of the enclosure LEDs, power supply units, and fans.

## EMM thermal shutdown

If critical internal temperatures are reached, the enclosure turns off automatically through either a thermal shutdown command issued by the EMM firmware or through a command from Dell OpenManage Server Administrator.

# Power indicator codes

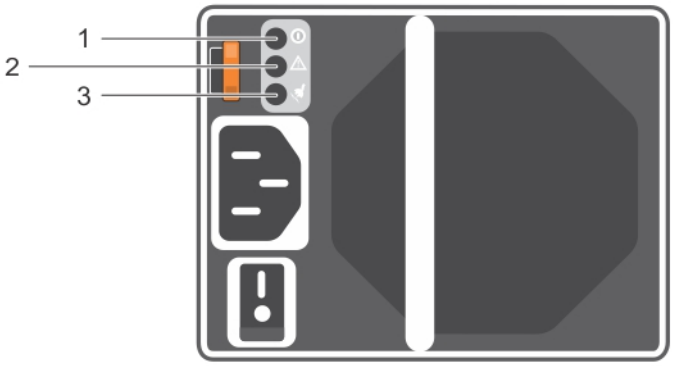


**Figure 6. Power indicator codes**

| Item | LED | Icon | Color | State |
|---|---|---|---|---|
| 1 | DC power | ⏻ | Green | • ON — Normal operation. Power supply is connected to DC power and the power switch is on. The power supply module is supplying DC power to the array.<br>• OFF — Indicates any one of the following:<br>– The power switch is off.<br>– The power supply module is not connected to power.<br>– There is a fault condition. |
| 2 | Power supply module fault | ⚠ | Yellow | • ON — Fault detected.<br>• OFF — OK.<br>• Blinks briefly when power is first turned on to the power supply module. |
| 3 | AC power | | Green | • ON — Power supply module is connected to a source of AC power irrespective of whether or not a power switch is on.<br>• OFF — Power supply module is completely disconnected from any source of AC power. |

# Other information you may need

⚠ **WARNING: See the *safety and regulatory inf*ormation that shipped with your system. Warranty information may be included within this document or as a separate document.**

- The rack documentation included with your rack solution describes how to install your system into a rack.
- The *Getting Started Guide* provides an overview of system features, setting up your system, and technical specifications.

- The OpenManage Server Administrator documentation provides information about managing your storage solution using the storage management service within the server administrator.
- The *Dell PowerEdge RAID Controller (PERC) H830 and Dell 12Gb SAS HBA User's Guide* provides information about configuring RAID.
- Any media that ships with your system that provides documentation and tools for configuring and managing your system, including those pertaining to the operating system, system management software, system updates, and system components that you purchased with your system.

NOTE: Always check for updates on dell.com/support/manuals and read the updates first because they often supersede information in other documents.

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# Installing enclosure components

## Recommended tools

You may need the following items to perform the procedures in this section:

- Key to the system keylock
- #2 Phillips screwdriver
- Wrist grounding strap

## Front bezel (optional)

### Removing the front bezel

1. Using the system key, unlock the front bezel (if locked).
2. Lift the release latch next to the keylock.
3. Pull the left end of the bezel away from the front panel.
4. Unhook the right end of the bezel and pull the bezel away from the system.

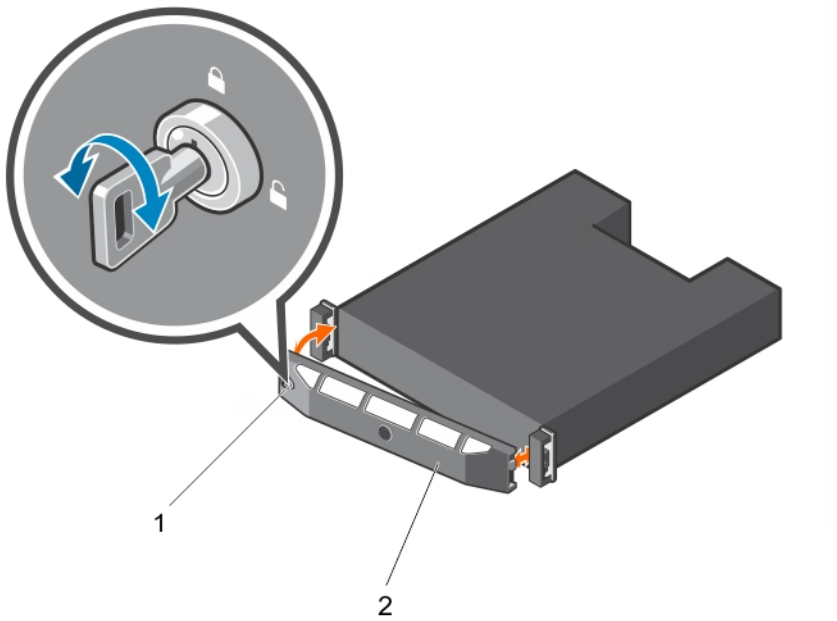


**Figure 7. Removing and installing the front bezel**

1. keylock
2. front bezel

### Installing the front bezel

1. Hook the right end of the bezel onto the chassis.
2. Fit the free end of the bezel onto the system.
3. Secure the bezel with the keylock.

# Hard disk drives

## Safety: Models AMT, E03J, and E04J

Models AMT, E03J, and E04J are intended for installation only in restricted access locations as defined in cl 1.2.7.3 of IEC 60950-1:2005.

On the basis of your configuration, your enclosure either supports up to up to 12 3.5-inch SAS hard disk drives in internal drive bays. Hard disk drives are connected to a backplane using hard disk drive carriers and are configured as hot-swappable.

**CAUTION: Do not turn off or reboot your enclosure while the hard disk drive is being formatted. Doing so can cause a hard disk drive to fail.**

When you format a hard disk drive, allow enough time for the formatting to complete. High-capacity hard disk drives can take many hours to format.

## Removing a hard disk drive blank

**CAUTION: To maintain proper system cooling, make sure all empty hard disk drive bays have blanks installed.**

1. If installed, remove the front bezel. See Removing the front bezel.
2. Press the release tab and pull the hard disk drive blank out until it is free of the hard disk drive bay.

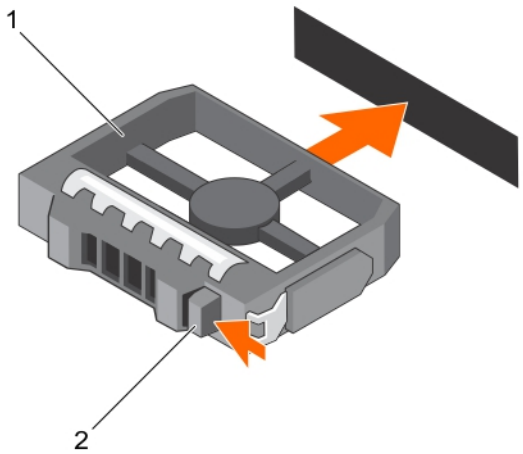


**Figure 8. Removing and installing a 3.5-inch hard disk drive blank**

1. hard disk drive blank
2. release tab

## Installing a hard disk drive blank

1. If installed, remove the front bezel. See Removing the front bezel.
2. Insert the hard disk drive blank into the hard disk drive bay until the blank is fully seated.
3. Close the handle to lock the blank in place.
4. If applicable, install the front bezel. See Installing the front bezel.

## Removing a hard disk drive

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. If installed, remove the front bezel. See Removing the front bezel.
2. From the management software, prepare the hard disk drive for removal. Wait until the hard disk drive indicators on the hard disk drive carrier indicates that the drive can be removed safely. See your controller documentation for information about removing hot-swapable hard disk drive.

   If the hard disk drive has been online, the green activity or fault indicator flashes as the hard disk drive is turned off . When the drive indicators are off, the hard disk drive is ready for removal. See Hard disk drive indicator patterns.
3. Press the release button to open the hard disk drive carrier release handle.
4. Pull the hard disk drive out until it is free of the hard disk drive bay. See Installing a hard disk drive blank.

   **CAUTION: To maintain proper system cooling, make sure all empty hard disk drive bays have blanks installed.**
5. Insert a hard disk drive blank in the empty drive bay. See Installing a drive blank.
6. If applicable, install the front bezel. See Installing the front bezel.

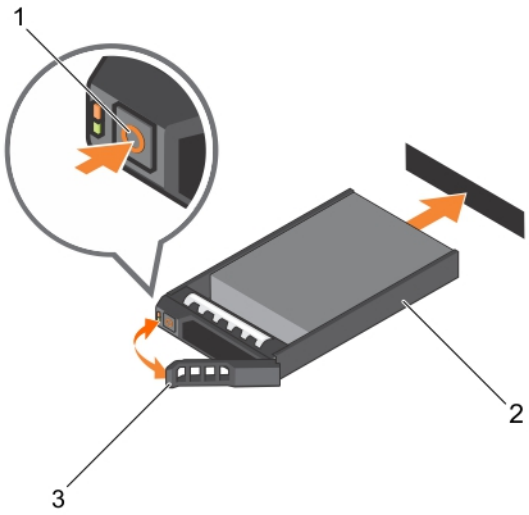


**Figure 9. Removing and installing a hard disk drive**

1. release button
2. hard disk drive
3. hard disk drive carrier handle

## Installing a hard disk drive

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

**CAUTION: Use only hard disk drives that have been tested and approved for use with the SAS backplane.**

**CAUTION: When installing a hard disk drive, ensure that the adjacent hard disk drives are fully installed. Inserting a hard disk drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.**

1. If applicable, remove the front bezel. See Removing the front bezel.
2. If applicable, remove the hard disk drive blank from the bay. See Removing a hard disk drive blank.
3. Press the release button to open the hard disk drive carrier release handle.
4. Insert the hard disk drive carrier into the hard disk drive bay until the carrier connects the backplane.
5. Close the handle to lock the hard disk drive in place.

## Removing a hard disk drive from a hard disk drive carrier

1. Remove the four screws from the slide rails on the hard disk drive carrier.
2. Lift the hard disk drive out of the hard disk drive carrier.

Remove the screws from the slide rails on the hard disk drive carrier and separate the hard disk drive from the carrier.

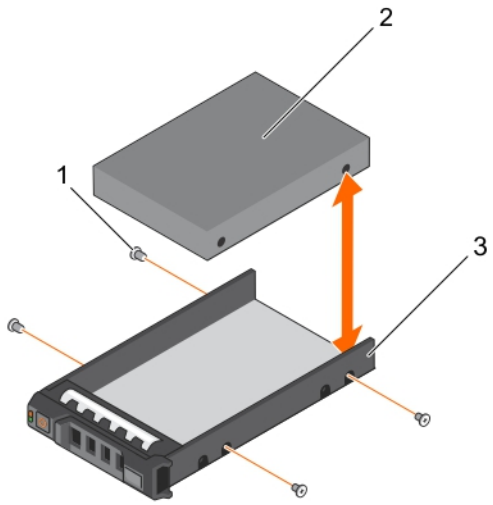


**Figure 10. Removing and installing a hard drive into a 3.5-inch hard disk drive carrier**

1. screws (4)
2. hard disk drive
3. hard disk drive carrier

### Installing a hard disk drive into a hard disk drive carrier

1. Insert the hard disk drive into the hard disk drive carrier with the connector end of the hard disk drive at the back.
2. Align the screw holes on the hard disk drive with the back set of holes on the hard disk drive carrier.
   When aligned correctly, the back of the hard disk drive is flush with the back of the hard disk drive carrier.
3. Install and tighten the four screws to secure the hard disk drive to the hard disk drive carrier.

## Enclosure Management Module

An enclosure with redundant enclosure management contains two enclosure management modules (EMM). You can cable your enclosure either in a single port, redundant mode or in a multi-mode configuration. If only one EMM is installed in your enclosure, it must be installed in EMM 0. You must install the EMM blank in EMM 1.

**NOTE:** EMMs can be removed and installed without turning off the enclosure.

**CAUTION: It is recommended that you do not remove an EMM while data is being transferred.**

**CAUTION: Replacing or installing an EMM that is connected to a host server causes it to end communication with the enclosure and requires a restart of the host server.**

## Removing an EMM blank

**CAUTION: To maintain proper system cooling, make sure you install an EMM blank in the empty slot.**

1. Remove EMM 0. See Removing an EMM blank.
2. To remove the EMM blank, press down on the release latch and pull the blank away from the enclosure.

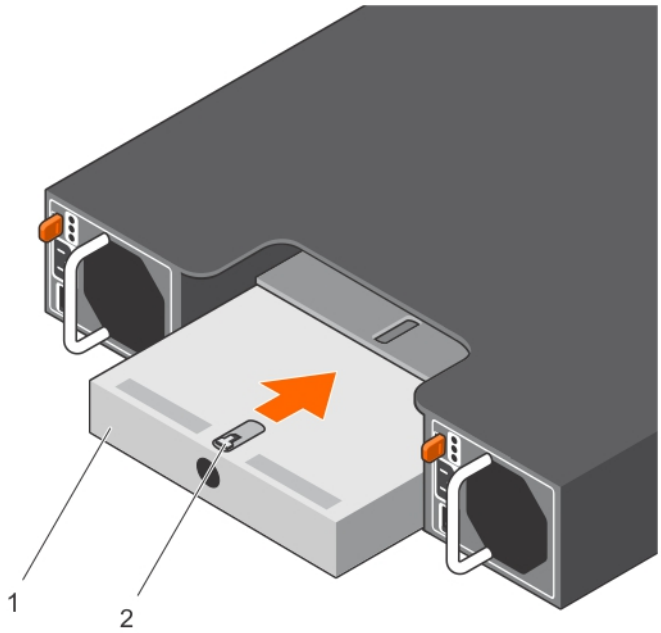


**Figure 11. Removing and installing an EMM blank**

1. EMM blank
2. release latch

## Installing an EMM blank

To install an EMM blank, align the blank with the EMM bay and insert the blank into the chassis until it clicks into place.

## Removing an EMM

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Disconnect the SAS cables connected to the EMM.
2. Push down on the release tab and pull the release lever away from the chassis.
3. Hold the release lever and pull the module away from the chassis.

NOTE: Stacking the EMM will damage the sensitive EMI contacts

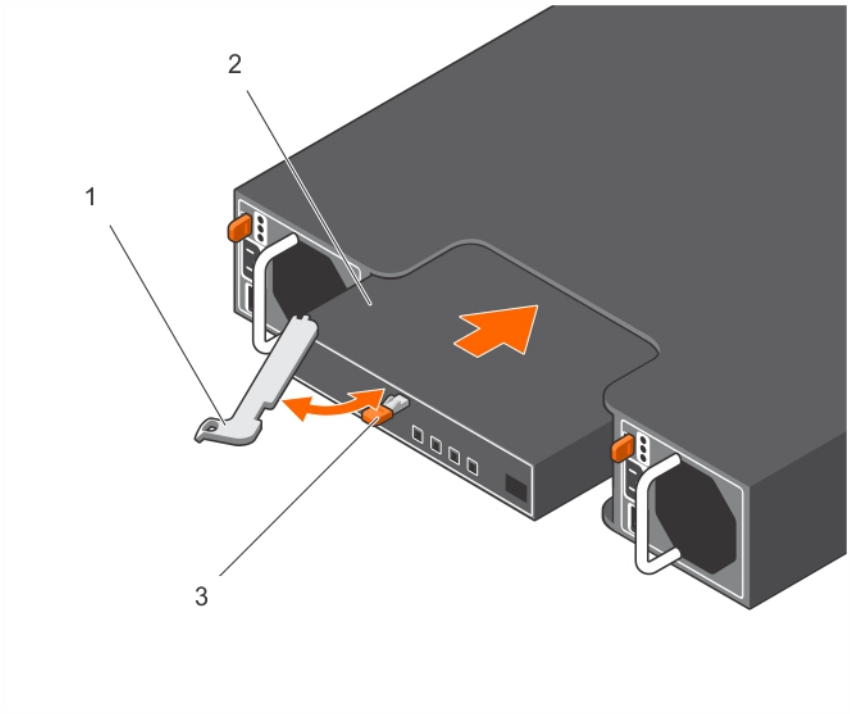


**Figure 12. Removing and installing an EMM**

1. release lever
2. EMM
3. release tab

## Installing an EMM

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Insert and seat the EMM into the EMM bay.
2. Push the release lever toward the chassis until it clicks into place.
3. Connect all the SAS cables to the EMM.
4. For information about the latest firmware, see the Dell Support website at **dell.com/support**
5. If applicable, update the firmware of the EMM.

NOTE: If two EMMs are installed in the enclosure, you must ensure that both the EMMs have the same firmware version installed. You can verify if both the enclosures use the same firmware version by checking the LEDs on the enclosure or by using Server Administrator.

For more information about EMM connections and cabling, see *Dell Storage MD1400 and MD 1420 Enclosure Hardware Deployment Guide*.

# AC power supply unit or cooling fan module

Your enclosure supports two hot-swappable power supply unit or cooling fan modules. While the enclosure can operate temporarily with one module, both the modules must be present for cooling the enclosure.

**CAUTION: A single power supply unit or cooling fan module can be removed from a turned on enclosure for a maximum period of five minutes. Beyond that time, the enclosure may automatically shut down to prevent damage.**

## Removing an AC power supply unit or cooling fan module

NOTE: If you remove a fully functioning power supply or cooling fan module, the fan speed in the remaining module increases significantly to provide adequate cooling. The fan speed decreases gradually when a new power supply or cooling fan module is installed.

1. Turn off the power supply unit or cooling fan module.
2. Disconnect the power cable from the power source.
3. Remove the Velcro straps that secure the power cable and then disconnect the power cable from the power supply or cooling fan module.

   **WARNING: The power supply unit or cooling fan modules are heavy. Use both hands while removing the module.**
4. Press the release tab and pull the power supply out of the chassis.

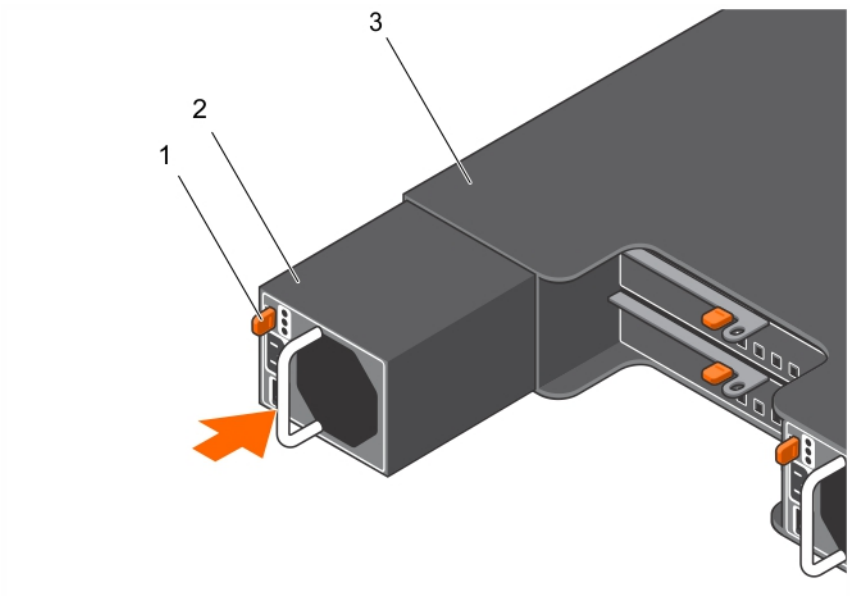


**Figure 13. Removing and installing a power supply unit or cooling fan module**

1. release tab
2. power supply unit
3. EMM or Power Supply Cage

## Installing an AC power supply unit or cooling fan module

1. Slide the power supply unit or cooling fan module into the chassis until the release tab clicks into place.
2. Connect the power cable to the power supply unit or cooling fan module and plug the cable into a power outlet.
3. Secure the power cable using the Velcro strap.

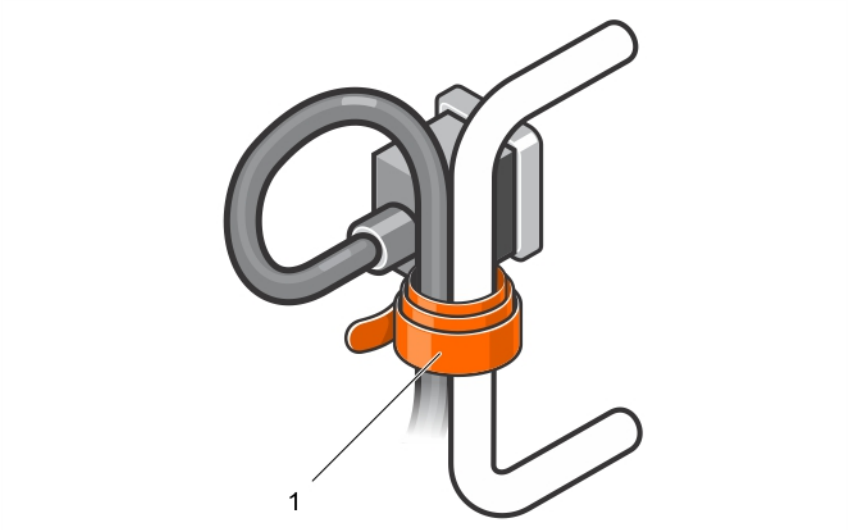


**Figure 14. Securing the power cable**

1. Velcro strap

**CAUTION: When connecting the power cable, secure the cable with the Velcro strap.**

NOTE: If the enclosure is powered on, all the power supply LEDs remain off until the AC power cable is connected to the power supply unit or cooling fan module and the power switch is turned on.

4. Turn on the power supply unit or cooling fan module.

# About DC power supply units

An MD Series storage array receives its power from two power supply modules. In a DC-powered MD Series storage array, the power supply module receives power from two 48 V DC PSUs. Each power supply module has two cooling fans.

NOTE: The fans that keep the array cool are integrated into the power supply modules and cannot be replaced separately. If a fan stops functioning, you must replace the entire power supply module.

## Power indicator codes

The DC power supply module has LEDs that indicate power supply status. Under normal conditions, the power output and line input LEDs are lit at the same time.

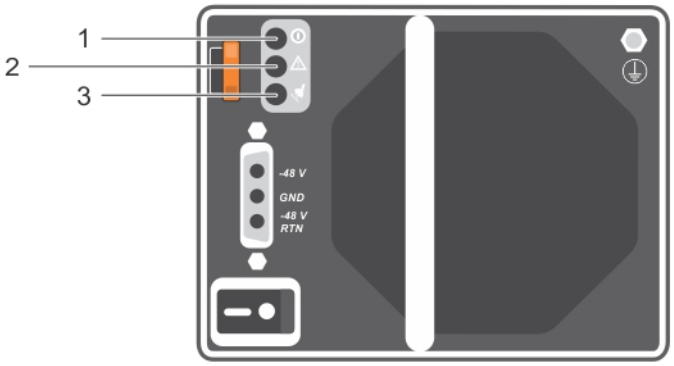


**Figure 15. Power indicator codes**

| Item | LED | Color | State |
|---|---|---|---|
| 1 | Power output | Green | • ON — Normal operation. Power supply is connected to DC power and the power switch is on. The power supply module is supplying DC power to the array.<br>• OFF — Indicates any one of the following:<br>– The power switch is off.<br>– The power supply module is not connected to power.<br>– There is a fault condition. |
| 2 | Power supply module fault | Yellow | • ON — Fault detected.<br>• OFF — OK.<br>• Blinks briefly when power is first turned on to the power supply module. |
| 3 | Line input | Green | • ON — Power supply module is connected to a source of DC power whether or not the power switch is on.<br>• OFF — Power supply module is completely disconnected from any source of DC power. |

## DC power supply module back panel features

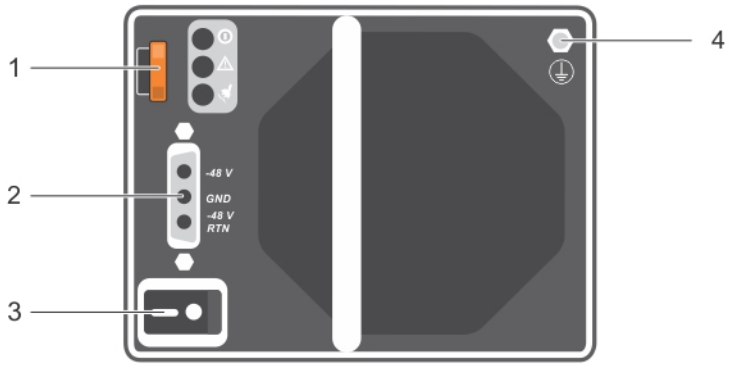


**Figure 16. DC power supply module back panel features**

| Item | Feature | Description |
|---|---|---|
| 1 | Power supply release lever | Unlocks the power supply module for removal from the storage array. |
| 2 | Connector on the power supply module | Connects the power supply module to the DC power supply module. |
| 3 | Power supply On or Off switch | Controls the power supply module power output to the storage array. |
| 4 | Protective safety earth ground | Provides grounding for the power supply module. It must be connected to the building's protective safety earth ground. |

## Removing and installing the DC power supply unit

### Input Requirements

- Supply voltage: –(48–60) V DC
- Current consumption: 25 A (maximum)

### Kit Contents

- Molex # 394260002 at PSU end
- Molex # 39422-0012 mating DC power connector

### Required Tools

- Hand-crimping tool (Tyco Electronics, 58433-3 or equivalent).
- Wire-stripper pliers capable of removing insulation from size 10 AWG solid or stranded, insulated copper wire.

  NOTE: Use alpha wire part number 3080 or equivalent (65/30 stranding).

### Required Wires

- One UL 4 AWG, 2 m maximum (stranded) black wire [–(48–60) V DC]
- One UL 4 AWG, 2 m maximum (stranded) red wire (V DC return)
- One UL 4 AWG, 2 m maximum (stranded) green/yellow/green with a yellow stripe wire (safety ground)

### Assembling and connecting the safety ground wire

**WARNING: For equipment using –(48–60) V DC power supplies, a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

NOTE: It is recommended that you use stranded copper wire type.

1. Strip the insulation from the end of the green or yellow wire (safety ground wire), exposing approximately 4.5 mm (0.175 inch) of copper wire.
2. Using a hand-crimping tool, crimp the ring-tongue terminal to the green or yellow wire.
3. Connect the safety ground wire to the grounding post on the back of the system using a #6/32 nut equipped with a locking washer and tighten it firmly to the grounding post.

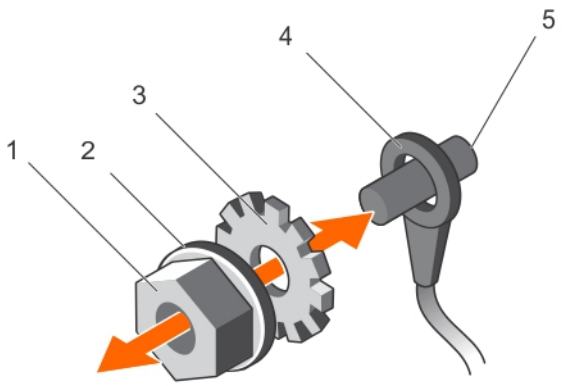


**Figure 17. Assembling and connecting the safety ground wire**

1. #6/32 nut
2. spring washer
3. locking washer
4. safety ground wire terminal
5. grounding post

## Wiring the power cables

**WARNING: For equipment using –(48–60) V DC power supplies, a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

The DC power supply module must be hard-wired to a DC power source in your environment by a qualified electrician. To wire your DC power supply module to a DC power source:

1. Make sure that the power switch is in the OFF position, and the power supply module is turned off.
2. Connect the open terminal (bare wire ends) to an appropriate DC power source.

   As specified in the following table:

   - Connect each wire on power cable to the matching wire or terminal on DC power source.
   - Each wire on the power cable is labeled with information for easy identification.

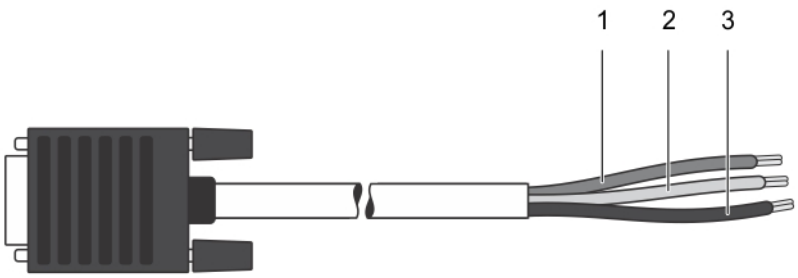


**Figure 18. Dc power cable d-shell connector and terminals**

| Pin | Description | Wire Color | Wire Size |
|---|---|---|---|
| 1 | 48V DC Safety Ground (F or G) | Green or Yellow | 10 AWG |
| 2 | –48V DC Return (+) | Blue | 10 AWG |
| 3 | –48V DC (–) | Black | 10 AWG |

## Connecting the power cable to the power supply module

1. Make sure that the power switch is in the OFF mode before connecting the DC power cable.
2. Connect the DC power supply cable to the power supply module by plugging the power cables into the matching power supply module plug connector.
3. Secure the power cables to the power supply module by fastening the power cables firmly to the system using the attached (trapped) finger screws.
4. Install the screws to the corresponding screw holes on the system and tighten until the power connector is firmly held in place.

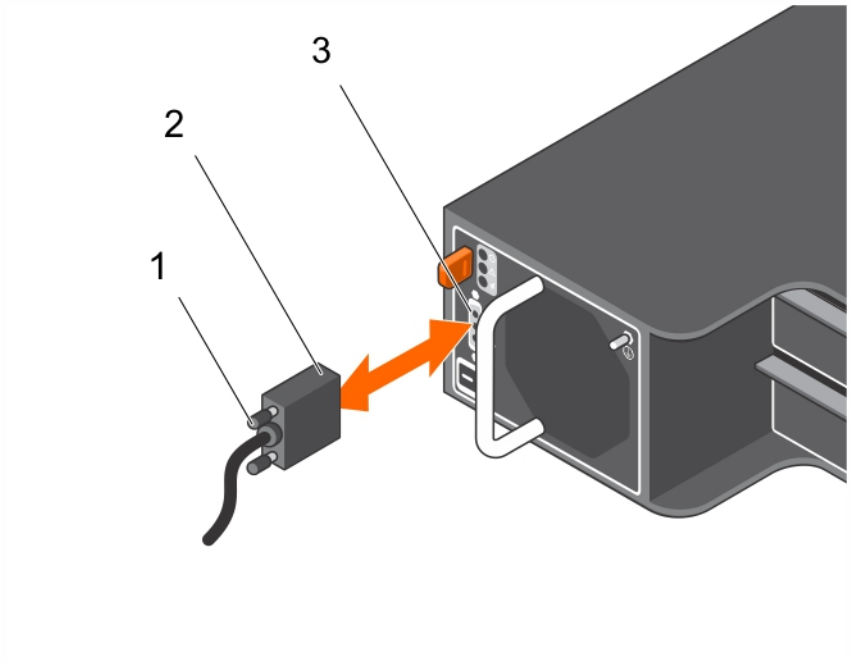


**Figure 19. Connecting the dc power cables**

1. attached (trapped) finger screws
2. connector on the power supply cable
3. connector on the power supply module

## Removing a DC power supply

**WARNING: For equipment using –(48–60) V DC power supplies, a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself .All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

**CAUTION: The system requires one power supply for normal operation. On power-redundant systems, remove and replace one power supply at a time when a system is turned on.**

NOTE: You must unlatch and lift the optional cable management arm if it interferes with power supply removal. For information about the cable management arm, see the system's rack documentation.

1. Turn off the power switches on the power supply module.
2. Remove the strap that secures the wires to the power supply module handle.
3. Disconnect the power wires from the power source and the connector from the power supply module you intend to remove.
4. Disconnect the safety ground wire.
5. Press the release latch and slide the power supply module out of the chassis.

   **CAUTION: The power supply module is heavy; support it with both hands.**

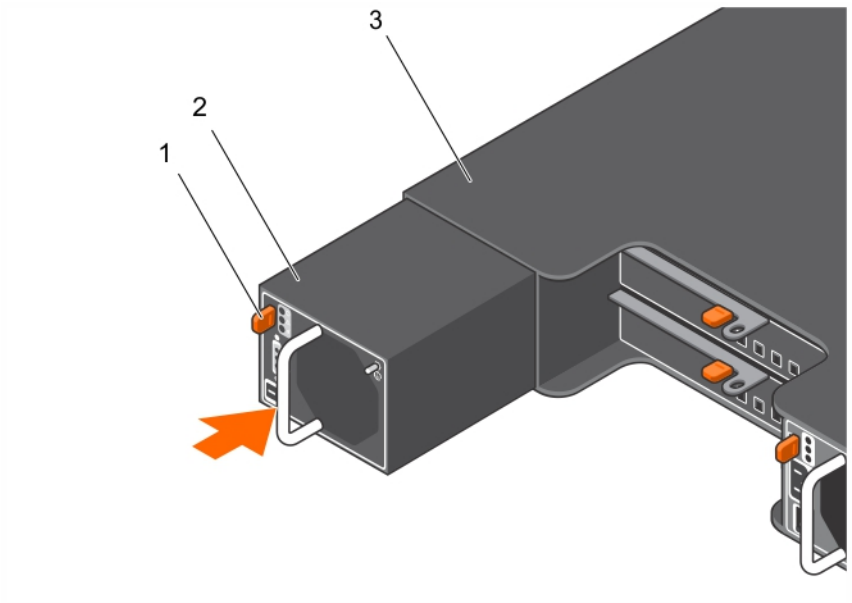


**Figure 20. Removing and installing a dc power supply module**

1. release latch
2. power supply module
3. power supply module handle

## Installing a DC Power Supply Module

**WARNING: For equipment using –(48–60) V DC power supplies, a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

1. Verify that both the power supply modules are the same type and have the same maximum output power.

   NOTE: The maximum output power (shown in Watt) is listed on the power supply module label.
2. Slide the new power supply module into the chassis until the power supply module is fully seated and the release latch snaps into place.

   NOTE: If you unlatched the cable management arm, relatch the arm. For information about the cable management arm, see the system's rack documentation.

   NOTE: Before the power cable is connected, the fans start spinning, powered by the other power supply module.
3. Ensure that the power switch is in the OFF mode.
4. Connect the safety ground wire.
5. Install the DC power connector in the power supply.

   **CAUTION: When connecting the power wires, secure the wires with the strap to the power supply module handle.**
6. Connect the wires to a DC power source.

NOTE: The line input LED lights up when the power cable is connected, even if the switches on the power supply modules are off.

NOTE: When installing, hot-swapping, or hot-adding a new power supply, allow several seconds for the system to recognize the power supply module and determine its status. The power-supply status indicator turns green to indicate that the power supply module is functioning properly.

### Power Supply Module Failures

You can identify a power supply module failure by any or all of the following:

- LEDs on the power supply modules.
- Messages on the console, in the event log, or in Modular Disk Storage Manager.

NOTE: When viewing the rear of the array, power supply module 0 is on the left, and power supply module 1 is on the right.

### Troubleshooting a DC power supply

**WARNING: For equipment using –(48–60) V DC power supplies, a qualified electrician must perform all connections to DC power and to safety grounds. Do not attempt connecting to DC power or installing grounds yourself. All electrical wiring must comply with applicable local or national codes and practices. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow all safety instructions that came with the product.**

**CAUTION: The system requires one power supply for normal operation. On power-redundant systems, remove and replace one power supply module at a time when a system is turned on.**

**CAUTION: A single power supply module can be removed from a switched-on array for a maximum of five minutes. Beyond that time, the array may automatically shut down to prevent damage.**

NOTE: In case a power supply module fails, make sure to leave the failed power supply module in the enclosure till the replacement power supply module is available.

NOTE: You must unlatch and lift the optional cable management arm if it interferes with power supply removal. For information about the cable management arm, see the system's rack documentation.

1. Verify that the power switch is in the ON position.
2. Locate the faulty power supply and determine the status of the LEDs.
   If the line input LED is not lit, check the power cable and power source to which the power supply is connected.
   - Make sure that the power cable is securely attached to the power source and the power supply.
   - Connect another device to the power source to verify if it is working.
   - Connect the cable to a different power source.
   - Replace the power cable.
3. Reseat the power supply by removing and reinstalling it.
   For more information, see Removing a DC power supply and Installing a DC power supply.

If the problem is not resolved, see Getting Help.

### Technical specifications

NOTE: The following specifications are only those required by law to ship with your system. For a complete and current listing of the specifications for your system, go to **dell.com/support**.

| Power | |
|---|---|
| AC Power Supply (per power supply) | |
| Watt | 600 W |
| Heat dissipation | 2047 BTU/hr (redundant, 600 W power supply) |
| NOTE: Heat dissipation is calculated using the power supply wattage rating. | |
| Voltage | 100–240 V AC, autoranging, 50/60 Hz |
| NOTE: This system is also designed to be connected to IT power systems with a phase to phase voltage not exceeding 230 V. | |
| DC Power Supply (per power supply) | |
| Watt | 700 W |
| Heat dissipation | 2388 BTU/hr (redundant, 700 W power supply) |
| NOTE: Heat dissipation is calculated using the power supply wattage rating. | |
| Voltage | –(48–60) V DC |

| Temperature | |
|---|---|
| Maximum operation ambient temperature | 35° C |

For information about supported expanded operating temperature range and configurations, see **dell.com/support/manuals**.

# Control panel

## Removing the control panel

1. Turn off the enclosure and host server.
2. Disconnect all the power cables connected to the enclosure.
3. Remove the hard disk drives from slot 0 to 2. See Removing a hard disk drive.
4. Slide the control panel out of the chassis after pushing the release tab toward the front of the enclosure.

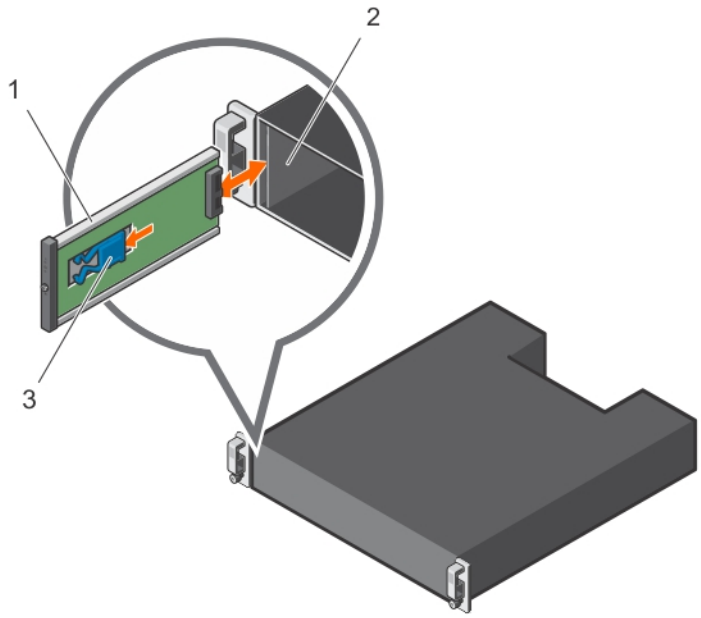


**Figure 21. Removing and installing the control panel**

1. control panel
2. chassis
3. release tab

## Installing the control panel

1. Align the control panel with the slot on the enclosure.
2. Slide the control panel into the enclosure until the release tab clicks into place.
3. Install the hard disk drives in their respective slots. See Installing a hard disk drive.
4. Connect all the power cables to the enclosure.
5. Turn on the enclosure and the host server.

# Backplane

**WARNING: Whenever you need to lift the enclosure, get others to assist you. To avoid injury, do not attempt to lift the enclosure by yourself.**

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

## Removing the backplane

1. Turn off the enclosure and disconnect it from the electrical outlet.
2. Disconnect all the cables connected to the enclosure.

3. Remove the hard disk drives. See Removing a hard disk drive.
4. Remove the EMMs. See Removing an EMM.
5. Remove the power supply or cooling fan modules. See Removing an AC power supply unit or cooling fan module.
6. Remove the control panel. See Removing the control panel.
7. Remove the screws that secure the EMM or power supply cage to the chassis.
8. Hold the cage removal ring at the bottom center of the enclosure and pull the EMM or power supply cage toward the back of the chassis.

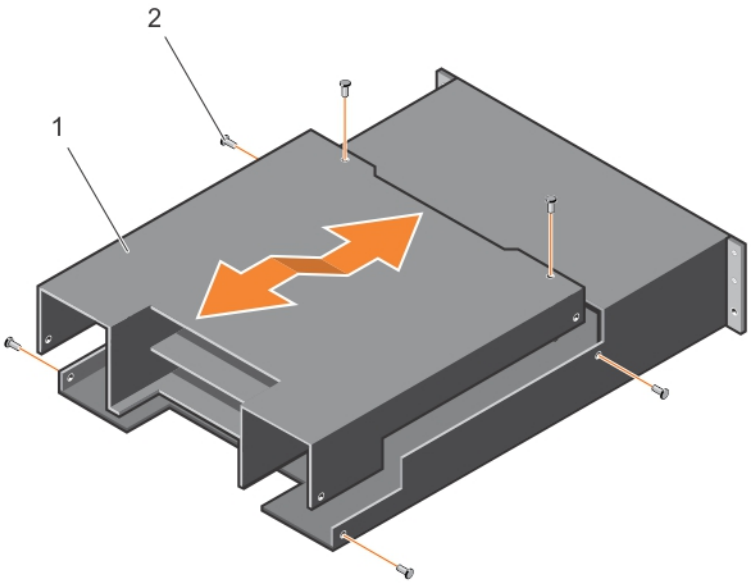


**Figure 22. Removing and installing the EMM or power supply cage**

1. EMM or power supply cage
2. screws (6)

9. Lift the EMM or power supply cage away from the chassis.
10. Loosen the captive screw that secures the backplane to the chassis.
11. Remove the screws that secure the backplane and pull the backplane out of the enclosure.

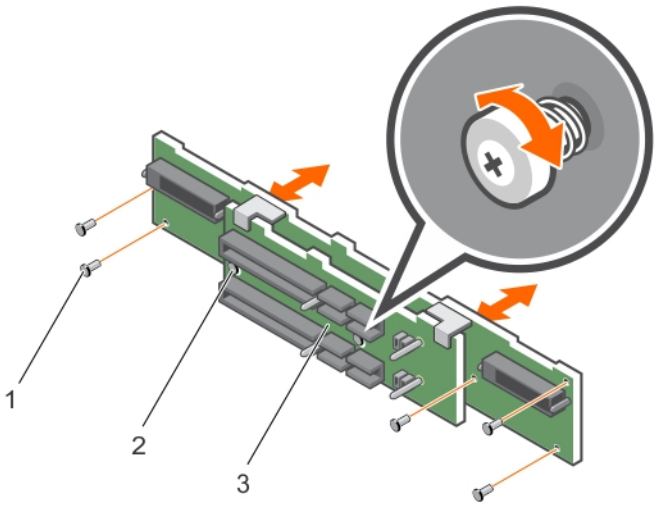


**Figure 23. Removing and installing the backplane**

1. screws (5)
2. captive screws (2)
3. backplane

## Installing the backplane

1. Align the holes on the backplane with the holes on the enclosure.
2. Tighten the captive screw to secure the backplane to the chassis.
3. Replace the screws that secure the backplane to the chassis.
4. Align the slots on the EMM or power supply cage with the tabs on the chassis.
5. Push the EMM or power supply cage toward the front of the enclosure.
6. Replace the screws that secure the EMM or power supply cage to the chassis.
7. Install the control panel. See Installing the control panel.
8. Install the power supply or cooling fan modules. See Installing an AC power supply unit or cooling fan module.
9. Install the hard disk drives. See Installing a hard disk drive.
10. Connect all the cables to the enclosure.
11. Turn on the enclosure and the host server.

3

# Troubleshooting your enclosure

## Safety first—for you and your enclosure

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

## Troubleshooting enclosure startup failure

If your system stops functioning during startup, check if:

- The enclosure fault LEDs are lit. See Enclosure Management Module.
- A message is displayed on the screen. See the Dell OpenManage Server Administrator documentation.
- There is a constant scraping or grinding sound when you access the hard disk drive. See Getting Help.

## Troubleshooting loss of communication

For information about troubleshooting loss of communication, see Troubleshooting Enclosure Management Modules.

## Troubleshooting external connections

- Verify that the cables are connected to the correct ports before troubleshooting any external devices. For the location of the back-panel connectors on your enclosure, see Back-panel features and indicators.
- Ensure that all the cables are securely attached to the external connectors on your enclosure.

## Troubleshooting power supply unit or cooling fan module

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

**CAUTION: It is recommended that you turn off the host server before turning off the enclosure to prevent loss of data.**

1. Locate the faulty PSU and determine the status of LEDs.

- If the AC power LED is not lit, check the power cord and power source into which the power supply is plugged.
  - Connect another device to the power source to verify if it is working.
  - Connect the cable to a different power source.
  - Replace the power cable.

  If the problem is not resolved, see Getting Help.

- If the DC power LED is not lit, verify that the power switch is turned on. If the power switch is turned on, see step 2.
- If the PSU's fault indicator is lit, see Getting Help.

**CAUTION: Power supply unit or cooling fan modules are hot-swappable. The enclosure can operate on a single power supply; however both modules must be installed to ensure proper cooling. A single power supply unit or cooling fan module can be removed from a powered-on enclosure for a maximum period of five minutes. Beyond that time, the enclosure may automatically shut down to prevent damage.**

2. Reseat the power supply by removing and reinstalling it. See AC power supply unit or cooling fan module.

   **NOTE:** After installing a PSUs, allow several seconds for the enclosure to recognize the PSUs and to determine if it is working properly.

   If the problem is not resolved, see Getting Help.
3. If all LEDs on the PSUs or cooling fan module are off and if the enclosure is powered on, you must update the firmware. For information about updating the firmware, see Dell Update Package at **dell.com/support**.

# Troubleshooting enclosure cooling problems

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

Ensure that none of the following conditions exist:

- Enclosure cover or hard disk drive blank is removed.
- Ambient temperature is too high. See Technical specifications.
- External airflow is obstructed.
- The power supply unit or cooling fan module is removed or has failed. See Troubleshooting power supply unit or cooling fan module.

If the problem is not resolved, see Getting Help.

# Troubleshooting Enclosure Management Modules

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

**CAUTION: It is recommended that you turn off the host server before turning off the enclosure to prevent loss of data.**

- If the EMM status LED is solid or blinking amber (2 or 4 times per sequence):
  - Turn off the server.
  - Remove the EMM and verify that the pins on backplane and EMM are not bent. See Removing an EMM.
  - Reinstall the EMM and wait for 30 seconds. See Installing an EMM.
  - Turn on the server.
  - Check the EMM status LED.
- If EMM status LED is blinking amber (5 times per sequence), update the firmware to the latest supported firmware on both the EMMs. For more information about downloading the latest firmware, see Dell Update Package at **dell.com/support**.
- If the link status LEDs are not green:
  - Turn off the server.
  - Reseat the cables on the storage enclosure and the server.
  - Restart the storage enclosure and wait until enclosure is fully booted.
  - Turn on the server.
  - Check the link status LED. If the link status LED is not green, proceed to the next step.

  If the problem is not resolved, see Getting Help.

# Troubleshooting hard disk drives

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Remove the hard disk drive from the enclosure. See Removing a hard disk drive.

   NOTE: You must ensure that you check the hard disk drive indicators before removing the faulty hard disk drive from the enclosure.
2. Check the hard disk drives and the backplane to ensure that the connectors are not damaged.
3. Reinstall the hard disk drive.
4. Restart the host server.

   If the problem is not resolved, go to task 5.
5. Verify that the EMM port link status LED and the EMM status LED are solid green for each port that is connected to a cable. If the LEDs are not solid green, see Enclosure Management Module.

6. Ensure that all the cables are attached correctly according to the enclosure mode you selected. For more information about enclosure modes, see *Dell Storage MD1400 and MD 1420 Enclosure Hardware Deployment guide*.
7. If you reseated the cables, reboot the host server. If the problem persists, see Troubleshooting loss of communication or see Getting Help.

# Troubleshooting enclosure connections

1. Verify that the EMM port link status LED and the EMM status LED are solid green for each port that is connected to a cable. If the LEDs are not solid green, see Enclosure Management Module.
2. Ensure that all the cables are attached correctly according to enclosure mode you selected. For more information about enclosure modes, see *Dell Storage MD1400 and MD 1420 Enclosure Hardware Deployment Guide*.
3. If you reseated cables, restart the host server.

   **NOTE:** You must turn off the host server before reseating the cables on the enclosure.

   If the problem is not resolved, see Getting Help.

# Troubleshooting a wet enclosure

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Turn off the enclosure and disconnect all the cables.
2. Remove the following components from the enclosure. See Installing enclosure components.
   - Hard disk drives
   - Enclosure Management Modules (EMMs)
   - Power supply units or cooling fan modules
   - Control panel
   - Backplane
3. Let the system dry thoroughly for at least 24 hours.
4. Reinstall the components you removed in task 2 earlier.
5. Connect all the cables and turn on the enclosure.

   If the enclosure does not start properly, see Getting Help.

# Troubleshooting a damaged enclosure

**CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.**

1. Ensure that the following components are properly installed:

- Hard disk drives
- EMMs
- Power supply unit or cooling fan modules
- Control panel
- Backplane

2. Ensure that all the cables are properly connected and that there are no damaged pins in the connectors.
3. Run diagnostics available in Server Administrator.

   If the test fails, see Getting Help.

4

# Getting help

## Contacting Dell

NOTE: Dell provides several online and telephone-based support and service options. If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog. Availability varies by country and product, and some services may not be available in your area.

To contact Dell for sales, technical support, or customer-service issues:

1. Go to **dell.com/support**.
2. Select your country from the drop-down menu on the top left corner of the page.
3. For customized support:
   a. Enter your system service tag in the **Enter your Service Tag** field.
   b. Click **Submit**.
      The support page that lists the various support categories is displayed.
4. For general support:
   a. Select your product category.
   b. Select your product segment.
   c. Select your product.
      The support page that lists the various support categories is displayed.

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